DISCUSSION AND CONCLUSIONS

The final section of this report will discuss some of the implications of archaeological data recovered from the Wrangle Hill Site. A short summary of the data from the site is presented along with discussions of regional lithic technologies, and household and community settlement patterns. Where applicable, future research directions are noted.

Site Summary

The archaeologists who worked on excavating the Wrangle Hill Site were only part of a long succession of human beings who spent time on that particular parcel of land in the Delaware High Coastal Plain. The high point of land at the junction of the two small ephemeral streams attracted human settlement for more than 8000 years. Prior to ca. 3000 B.C. the occupations were ephemeral and the only signs of the site's earliest inhabitants are scattered projectile points. These early hunters and gatherers probably briefly camped at the site and procured resources from the rich wetlands found adjacent to the site.

The use of the Wrangle Hill Site by its later inhabitants was somewhat different from that of earlier inhabitants. After ca. 3000 B.C., the site seems to have been inhabited for longer periods of time, perhaps for more than one season of the year. These later Woodland Period people constructed semi-subterranean pithouses and dug storage and processing pits. However, the site was still used by relatively small groups of people. It is very safe to say that the site almost certainly was never inhabited by more than one family at a time. The houses were small, and could not have enclosed more than a single family. There seems to have been little change in the way that the site was used from approximately 3000 B.C. to A.D. 1500.

The prehistoric people who lived at the site probably brought a series of stone tools with them when they came there to live. As these tools were used and broken, new replacement tools were manufactured from the flat plates of ironstone that naturally occur at the site. Use of the ironstone required special reduction techniques and left very distinctive stone debitage scattered across the site. Ceramics vessels were also used for cooking, storage, and processing. When the vessels were broken, they were discarded in the pit features.

In sum, the Wrangle Hill Site was the home to numerous prehistoric groups over a long portion of Delaware's prehistory. The initial use was sporadic, but over time the occupations became more substantial and there was very little change in the way that the site was used. Nevertheless, the populations using the site were never large at any point in the history of its use.

TABLE 11

Comparative Lithic Resource Use Data

Site	Function (Complex)	Total Artifacts	Cortex %	Crypto-crystalline %	Quartz/ Quartzite %	Reference
Wrangle Hill	**Micro-band base camp**	**2,437**	**5**	**45**	**21**	
7K-C-203						
Area A	Base camp	1,163	40	85	14	Custer et al. (1994)
Area B	Base camp	3,184	36	75	24	Custer et al. (1994)
Area C	Base camp	5,452	33	69	23	Custer et al. (1994)
Woods	Base camp	1,496	26	41	57	Custer et al. (1994)
7K-C-194A	Base camp (Woodland II)	1,230	28	63	35	Custer, Riley, & Mellin (1994)
7K-C-360	Hunting/ staging	2,287	30	56	41	Riley, Watson, & Custer (1994)
7K-C-365A	Hunting/ staging	2,537	38	51	46	Riley, Watson, & Custer (1994)
7K-C-365B	Lithic reduction	8,130	4	5	94	Riley, Watson, & Custer (1994)
7S-G-123	Cobble reduction	164	54	65	23	Custer and Mellin (1991)
7K-C-204	Macro-band base camp	124	27	54	37	Riley et al. (1994)
7K-C-359	Micro-band base camp	160	26	63	33	Riley et al. (1994)
7K-C-363	Procurement	133	21	76	19	Riley et al. (1994)
7K-C-364	Staging/ processing	1,742	32	56	39	Riley et al. (1994)
7NC-D-100	Procurement	293	41	51	46	Shaffer et al. (1988)
7NC-D-3	Quarry reduction	368	0	51	38	Custer, Ward, & Watson (1986)
7NC-D-5	Quarry reduction	94	0	60	32	Custer, Ward, & Watson (1986)
7NC-E-9	Micro-band base camp	4,090	14	79	18	Custer et al. (1990)
7NC-E-46	Hunting/ staging	10,512	20	22	69	Custer and Bachman (1984)
7NC-D-54	Cobble reduction base camp	1,288	28	32	59	Custer et al. (1981)
7NC-D-55A	Cobble reduction base camp	132	45	16	69	Custer et al. (1981)
7NC-D-55B	Cobble reduction base camp	2,304	29	8	88	Custer et al. (1981)
7NC-A-17	Hunting/ staging	279	9	23	71	Custer and Hodny (1989)
7NC-A-2	Base camp	845	38	18	67	Custer and De Santis (1985)
36LE4	Lithic reduction	306	0	1	97	Custer (1992)
7NC-D-125						
Area A	Staging/ processing	10,576	1	98	2	Riley, Custer, Hoseth, & Coleman (1994)
Area B	Staging/ processing	1,931	2	92	8	Riley, Custer, Hoseth, & Coleman (1994)
Area C	Staging/ processing	1,096	13	54	45	Riley, Custer, Hoseth, & Coleman (1994)
7NC-D-129	Procurement	2,207	7	74	26	Custer et al. (1988)
7NC-D-140	Procurement	133	21	75	25	Catts, Hodny, & Custer (1989)
7NC-E-6A						
Area 2A	Macro-band base camp	5,515	9	60	34	Custer (1982)
Area 2B	Macro-band base camp	6,206	9	71	23	Custer (1982)
7NC-D-19	Quarry reduction base camp	653	0	74	26	Custer, Ward, & Watson (1986)
7NC-F-61A	Quarry reduction base camp	1,922	1	99	1	Watson and Riley (1994)
7NC-G-101	Base camp (Clyde Farm)	2,388	28	79	17	Custer and Silber (1994)
	Base camp (Webb)	153	37	73	25	Custer and Silber (1994)
	Base camp (Woodland II)	329	23	80	14	Custer and Silber (1994)

Regional Lithic Technologies

The lithic artifact assemblage from the Wrangle Hill Site can be compared to assemblages from other sites using a variety of techniques applied in other reports in this series. These techniques focus on the analysis of percentages of artifacts with cortex and varied lithic raw material use (e.g., Riley, Custer, Hoseth, Coleman 1994). Table 11 lists the data used in these comparisons and Figure 19 shows the locations of the sites used in the analyses. Tables 12 and 13 show rankings of the sites listed in Table 11 with respect to cortex percentages and cryptocrystalline raw material percentages. In these tables the sites are listed in order from lowest to highest by percentage frequency. Pairwise comparisons of site percentages using difference-of-proportion tests (Parsons 1974) were undertaken for all sites. Sites with similar percentage values are linked by brackets in these tables. It should be noted that percentages of quartz and quartzite are often used in these comparative analyses in order to monitor the use of non-cryptocrystalline materials. Quartz and quartzite comparisons were not used in this analysis because they represent a small percentage of the Wrangle Hill assemblage, and because ironstone is the major non-cryptocrystalline raw material used.

FIGURE 19

Lithic Assemblage Sample Site Locations

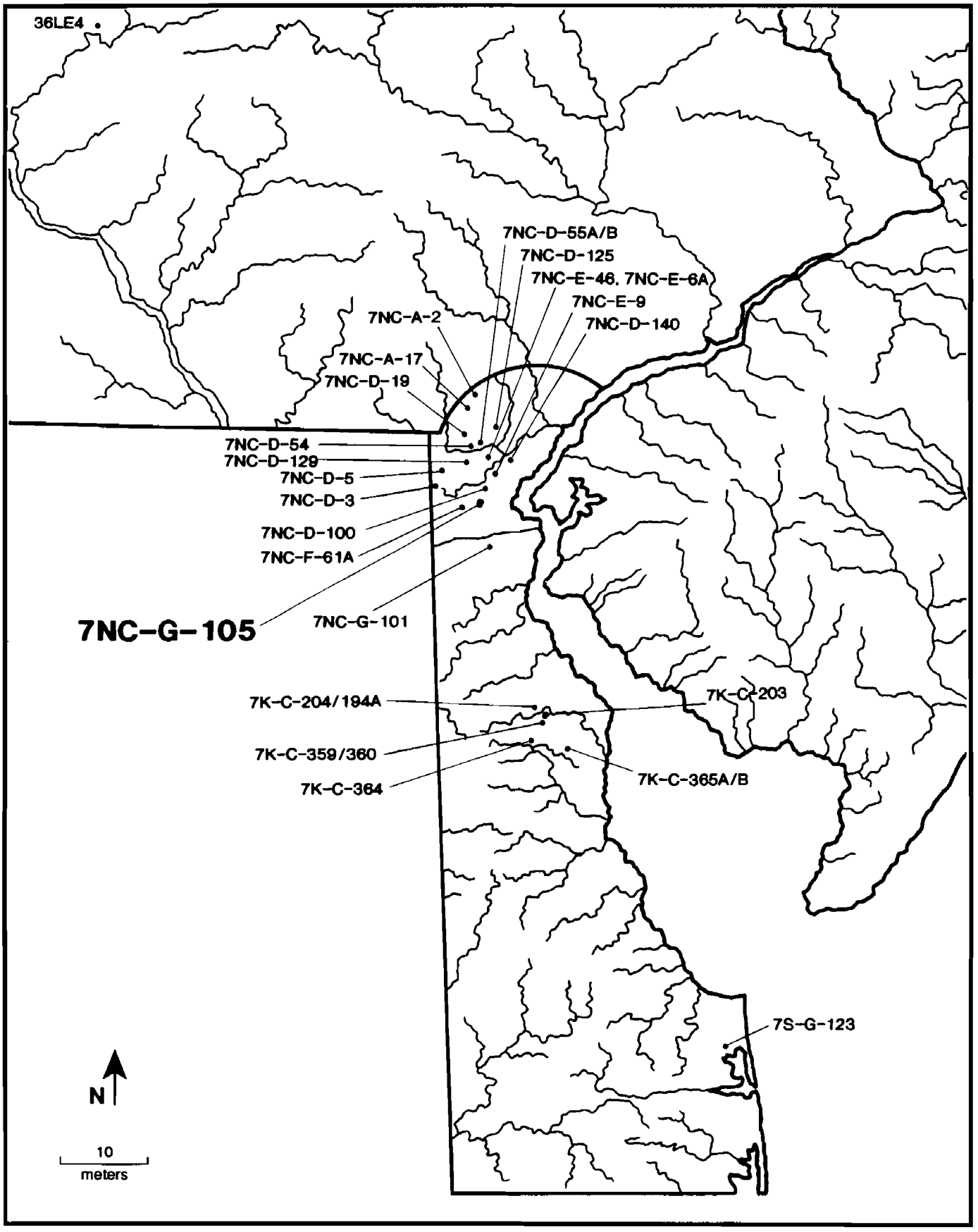

TABLE 12
Cortex Percentage Ranking

SITE	SITE TYPE (COMPLEX)	CORTEX %
7NC-D-5	Quarry Reduction Base Camp	0
7NC-D-3	Quarry Reduction Base Camp	0
36LE4	Lithic Reduction	0
7NC-D-19	Quarry Reduction Base Camp	0
7NC-F-61A	Quarry Reduction Base Camp	1
7NC-D-125A	Staging/Processing	1
7NC-D-125B	Staging/Processing	2
7NC-A-2	Base Camp	2
7K-C-365B	Lithic Reduction	4
Wrangle Hill	**Micro-Band Base Camp**	**5**
7NC-D-129	Procurement	7
7NC-E-6A		
Area 2A	Base Camp	9
Area 2B	Base Camp	9
7NC-A-17	Staging/Processing	9
7NC-D-125C	Staging/Processing	13
7NC-E-9	Base Camp	14
7NC-E-46	Processing/Staging	20
7NC-D-140	Procurement	21
7K-C-363	Procurement	21
7NC-G-101	Base Camp (Woodland II)	23
7K-C-203 Woods	Base Camp	26
7K-C-359	Base Camp	26
7K-C-204	Base Camp	27
7K-C-194A	Base Camp (WoodlandII)	28
7NC-D-54	Cobble Reduction Base Camp	28
7NC-G-101	Base Camp (Clyde Farm)	28
7NC-D-55B	Cobble Reduction Base Camp	29
7K-C-360	Processing/Staging	30
7K-C-364	Processing/Staging	32
7K-C-203 Area C	Base Camp	33
7K-C-203 Area B	Base Camp	36
7NC-G-101	Base Camp (Webb)	37
7NC-A-2	Base Camp	38
7K-C-365 A	Processing/Staging	38
7K-C-203 Area A	Base Camp	40
7NC-D-100	Procurement	41
7NC-D-55A	Cobble Reduction Base Camp	45
7S-G-123	Cobble Reduction Base Camp	54

TABLE 13
Cryptocrystalline Percentage Ranking

SITE	SITE TYPE (COMPLEX)	CRYPTO - CRYSTALLINE
36LE4	Lithic Reduction	1
7K-C-365B	Lithic Reduction	5
7NC-D-55B	Cobble Reduction Base Camp	8
7NC-D-55A	Cobble Reduction Base Camp	16
7NC-A-2	Base Camp	18
7NC-E-46	Staging/Processing	22
7NC-A-17	Staging/Processing	23
7NC-D-54	Cobble Reduction Base Camp	32
Wrangle Hill	**Micro-Band Base Camp**	**45**
7K-C-203 Woods	Base Camp	51
7NC-D-100	Procurement	51
7NC-D-3	Quarry Reduction	51
7K-C-365A	Staging/Processing	54
7K-C-204	Base Camp	54
7NC-D-125C	Staging/Processing	56
7K-C-364	Staging/Processing	56
7K-C-360	Staging/Processing	
7NC-E-6A		60
Area 2A	Base Camp	60
7NC-D-5	Quarry Reduction	63
7K-C-359	Base Camp	63
7K-C-194A	Base Camp (Woodland II)	65
7S-G-123	Cobble Reduction Base Camp	
7K-C-203 Area C	Base Camp	
7NC-E-6A		71
Area 2B	Base Camp	73
7NC-G-101	Base Camp (Webb)	74
7NC-D-19	Quarry Reduction Base Camp	74
7NC-D-129	Procurement	75
7NC-D-140	Procurement	
7K-C-203 Area B	Procurement	76
7K-C-363	Base Camp	79
7NC-E-9	Base Camp	79
7NC-G-101	Base Camp (Clyde Farm)	80
7NC-G-101	Base Camp (Woodland II)	
7K-C-203 Area A	Base Camp	92
7NC-D-125B	Staging/Processing	98
7NC-D-125A	Staging/Processing	99
7NC-F-61A	Quarry Reduction Base Camp	

Table 12 shows the site rankings by cortex percentages. The Wrangle Hill Site falls in the grouping of sites with the lowest cortex frequencies. Most of the sites in this category show low incidences of use of secondary cobble materials because other lithic materials are available for use. In the case of the Wrangle Hill Site, the alternative raw material is ironstone. The presence of a variety of different site types in this grouping indicates that differential access to varied raw material types was more important than site functions in determining use of primary and secondary lithic raw materials.

Table 13 shows a ranking of sites by cryptocrystalline raw material percentages. The Wrangle Hill assemblage falls in the low end of the group of sites with moderate cryptocrystalline percentages. As was the case for cortex groupings, the site groupings contain a variety of site types and this variety implies that lithic resource availability was more important than specialized site activity areas in determining the lithic resources used at a site.

TABLE 14

Lithic Resource Use Classification

CRYPTOCRYSTALLINE	CORTEX: HIGH	CORTEX: LOW
HIGH	7NC-G-101 (Webb Complex, base camp) 7NC-G-101 (Clyde Farm, base camp) 7NC-G-101 (Woodland II, base camp) 7K-C-363 (procurement) 7NC-D-140 (procurement) 7K-C-203 Area A (base camp) 7K-C-203 Area B (base camp) 7K-C-203 Area C (base camp)	7NC-E-9 (base camp) 7NC-E-6B, Area 2B (base camp) 7NC-D-129 (procurement) 7NC-D-125B (processing/staging) 7NC-D-125A (processing/staging) 7NC-F-61A (quarry reduction base camp) 7NC-D-19 (quarry reduction base camp)
MEDIUM	7S-G-123 (cobble reduction base camp) 7NC-D-100 (procurement) 7K-C-365A (processing/staging) 7K-C-364 (processing/staging) 7K-C-360 (processing/staging) 7NC-D-54 (cobble reduction base camp) 7K-C-194A (Woodland II, base camp) 7K-C-204 (base camp) 7K-C-359 (base camp) 7K-C-203 Woods (base camp)	7NC-D-125C (processing/staging) 7NC-E-6A, Area 2A (base camp) 7NC-D-3 (quarry reduction base camp) 7NC-D-5 (quarry reduction base camp) WRANGLE HILL ←
LOW	7NC-D-55A (cobble reduction base camp) 7NC-A-2 (base camp) 7NC-D-55B (cobble reduction base camp) 7NC-E-46 (processing/staging)	7NC-A-17 (processing/staging) 7K-C-365B (lithic reduction) 7NC-A-2 (base camp) 36LE4 (lithic reduction)

Table 14 shows a classification of the sites listed in Table 11 based on cortex and cryptocrystalline percentages. The Wrangle Hill Site falls within a group of sites that shows moderate cryptocrystalline percentages and low incidence of cortex. The other sites in this group share the common feature of access to lithic resources other than cobbles, and when other sources are available, secondary cobble resources are not used. In sum, prehistoric flintknappers of the Delaware Coastal Plain were opportunistic, but when they could, they avoided the use of secondary cobble resources.

Another topic that can be discussed with regard to regional lithic technologies is the use of ironstone. Ward (1985) reviewed the use of ironstone in the central Middle Atlantic region and showed that this distinctive raw material was used mainly during the Clyde Farm Complex time period (ca. 3000 - 500 B.C.). Ironstone was used primarily to manufacture bifacial tools and generally was a minor component of most lithic tool kits. The exception was the Herring Island Site where vast quantities of high quality ironstone were available for quarrying. The intensive use of ironstone at the Wrangle Hill Site is like that seen at Herring Island, and this intensive use suggests that when ironstone was readily available it was used for the manufacture of bifacial tools. Ward's data and the data from Wrangle Hill also suggest that one of the major uses of ironstone was for the manufacture of large wide-bladed cutting tools.

When the northern Delmarva Peninsula is considered within a larger framework of the central Middle Atlantic region, the use of ironstone can be seen as one of many instances of use of relatively tough, non-cryptocrystalline lithic materials for the manufacture of cutting tools. In southeastern Pennsylvania, quartzite, argillite, and diabase were used (Custer 1994). In the central Delmarva Peninsula and the New Jersey Coastal Plain, argillite and some ironstone are used (Custer 1989). In central Pennsylvania and the Maryland Piedmont, rhyolite is used (Stewart 1984). These special patterns of raw material use are also coincident with the initial appearance of relatively specialized broad-bladed cutting tools including broadspear types and the larger stemmed point forms. A variety of explanations have been proposed for these technological changes (see review in Custer 1991), and none are particularly satisfying. The most that can be said here is that the Wrangle Hill Site assemblage conforms to the broader regional pattern and future research should seek clearer explanations of this interesting technological change.

Household Settlement Patterns

One topic that can be addressed with regard to household settlement patterns is the issue of identification of potential Archaic Period pit houses in Delaware. Currently available archaeological data for Delaware suggest that the first pit houses appeared in Delaware no earlier than 3000 B.C., and perhaps a millennium later. The oldest dated house feature in the state is a defined by a series of post molds at the Hockessin Valley Site in the northern Delaware Piedmont (Custer and Hodny 1989), and it does not have a semi-subterranean component. The Hockessin Valley Site house feature dates to ca. 3000 B.C. at the transition between the Archaic and Woodland I periods.

It is important to point out, however, that there are two sites where diagnostic Archaic projectile points have been found in pit house feature fill (Dover Downs - Riley, Watson, and Custer 1994; Pollack - Custer, Hoseth, Silber, Grettler, and Mellin 1994). The possible Archaic Type I stemmed points found in Feature 83 from the Wrangle Hill Site make a possible third candidate. In the cases of the Dover Downs and Pollack sites, the occurrence of the Archaic points in the fill of pit house features was ascribed to the multi-component occupations of the sites and the inclusion of older diagnostic artifacts in the pit fill of younger Woodland Period features. The co-occurrence of the Archaic points with younger diagnostic artifacts, such as Woodland Period ceramics, and anomalous radiocarbon dates support the contention that the pithouse features do <u>not</u> date to the same time period as the Archaic artifacts in the pit fill.

The Wrangle Hill Site is different, however, in that there are no anomalous artifact associations in Feature 83. Based on analysis of collections from the stratified Piney Island Site in southeastern Pennsylvania (Custer 1994), there is a better than even chance that the two Type I stemmed projectile points from Feature 83 (Plates 10A and B) predate 3000 B.C. Thus, the pithouse represented by Feature 83 is slightly more likely to date to the Archaic Period than to the Woodland Period.

In sum, Feature 83, with its Type I stemmed points, is not a clear-cut example of an Archaic pit house. However, it does provide a hint that such early pit houses may indeed be present in Delaware. During future excavations, archaeologists will have to be aware that such early houses may indeed exist in the archaeological record. We will also need to be careful that we do not too quickly dismiss finds of Archaic Period diagnostic artifacts in pit house fill as the result of mixed and disturbed stratigraphy.

Community Settlement Patterns

The Wrangle Hill Site can be viewed as a classic example of a micro-band base camp as defined for Delaware (Custer 1989). There are only a few instances of houses and not many artifacts. The site is relatively small in area compared to some of the very large base camps recently excavated in Delaware (e.g., the Pollack Site - Custer, Hoseth, Silber, Grettler, and Mellin 1994), and is located in an interior area away from the major riverine and estuarine environmental zones. Also, there are no indications that the site was occupied by more any more than one family at any given time. In sum, the site fits all of the hypothesized characteristics of a micro-band base camp.

The problem that emerges in the study of Delaware prehistoric settlement patterns of the Woodland Period, however, is the fact that the larger sites that were thought to represent so-called macro-band base camps with high population densities, such as the Pollack Site (Custer, Hoseth, Silber, Grettler, and Mellin 1994), have now been shown to merely be large scale versions of sites like Wrangle Hill. There are only a few indications of multiple family groups occupying the large macro-band base camps, such as at the Snapp Site (Custer and Silber 1994), and these examples are still rather small with no more than five or six families present at any given time. Based on the currently available data, it looks like people rarely, if ever, congregated in large social groups during prehistoric times in Delaware and we really have no true examples of macro-band base camps as the term is usually applied (MacNeish 1971). Phrased another away, the research problem that needs to be addressed is the identification of community settlement pattern variability between large and small base camp sites with regard to variables other than site size.

The data from the Wrangle Hill Site can be used to begin to address this research issue with regard to the types and kinds of features seen at large and small base camp sites. Table 15 shows the numbers and percentages of house related features and other feature types at a series of large base camps and the smaller Wrangle Hill Site. The data in Table 15 show that the feature assemblages at the large base camp sites are rather diverse. The largest site, the Pollack Site, has a feature assemblage comprised primarily of house-related features, as does the Leipsic Site. In contrast, the Delaware Park and Snapp sites are large base camps with high proportions of non-house-related features, namely storage/ processing/refuse pits. The Wrangle Hill Site is more similar to the Snapp and Delaware Park sites.

TABLE 15

Frequencies of Feature Types at Large and Small Base Camp Sites

	HOUSE RELATED FEATURES		NON-HOUSE RELATED FEATURES		
SITE	Number	%	Number	%	TOTAL
Wrangle Hill	6	19	25	81	31
Snapp (1)	74	36	133	64	207
Leipsic (2)	209	86	34	14	243
Pollack (3)	785	93	60	7	845
Delaware Park (4)	25	16	129	84	154

1 - Custer and Silber (1994)
2 - Custer, Riley, and Mellin (1994)
3 - Custer, Hoseth, Silber, Grettler, and Mellin (1994)
4 - Thomas (1981)

There are many possible explanations for the feature assemblage variability seen in Table 15. One explanation may be geographic in that the Pollack and Leipsic sites are located in the Low Coastal Plain in the central part of the state and the other sites are all located in the High Coastal Plain in the northern part of the state. Differences in topography and seasonal differences in local environments between the two areas could produce different community patterns in terms of the combinations of houses and storage features needed by Woodland Period communities. Varied seasonal occupations could also affect the needs for storage and the varied types of storage facilities used. Frequencies of non-house-related features could also be related to intensity and duration of settlement. And, all of the above factors could combine to produce variability in the types and kinds of features that made up prehistoric Woodland Period communities in Delaware. In sum, archaeologists will need to be aware that the basic community type definitions used for Delaware (Custer 1986) will vary from area to area. Future research should seek to document this variability and to understand how it relates to variability in the prehistoric societies who inhabited these sites.

CULTURAL RESOURCE MANAGEMENT RECOMMENDATIONS

Test excavations at the Wrangle Hill Site constituted data recovery, and no further archaeological work is recommended.